Discrete-event simulation to reduce waiting time in accident and emergency departments: A case study in a district general clinic

Nuñez Perez, Nixon De Jesus; Ortiz Barrios, Miguel Angel; Salas Navarro, Katherinne Paola; McClean, S. I.; Jimenez, Genett

Abstract

Waiting time is a crucial performance metric in A&E departments. In this regard, longer waiting times are related to low patient satisfaction, high mortality rates and more severe physical health complications. To analyze patient flow in these departments, discrete-event simulation (DES) has been used; however, its applicatin has not been extended to evaluate the impact of improvement strategies. Therefore, this paper aims to design and pretest operational strategies for better ED care delivery using DES. First, input data analysis is carried out. Afterward, the DES model is developed and validated to establish whether it is statistically comparable with the real-world. Then, performance indicators of the current system are computed and analyzed. Finally, improvement strategies are proposed and evaluated by simulation modelling and statistical tests. A case study of an A&E department from a district general clinic is presented to validate the proposed framework. In particular, we will validate the effectiveness of introducing a triage system (Scenario 3), a strategy that is not currently adopted by the clinic. Results demonstrate that waiting times could be meaningfully diminished based on the proposed approaches within this paper.

Keywords

Accident and emergency (A&E), Discrete event simulation (DES), Emergency departments (EDs), Healthcare.